orientations. The plate and the mechanism for controlling the positions of the plate may be the substantially the same as that shown in my previous U.S. Pat. No. 5,178,602. For example, an electromagnet **38** may be provided to control the position of the locking plate by action on a permanent magnet **40**, which is attached to the locking plate.

Preferably, the electromagnet **38** and magnet **40** are positioned such that the locking plate can be placed in either of two positions. In a first position, shown in phantom lines, the plate does not engage the frame **32**, and the frame **32** is free to rotate about pivot **34**. In a second position, shown in solid lines at **36'**, the locking plate engages one of two parts of the frame **32** to hold it in one of two selected orientations. In the position shown in FIG. **3***a*, a lip of the plate engages a protuberance **42** on the frame **32** to lock the container in the orientation shown in FIG. **3***a*. In the position shown in FIG. **3***b* the plate **36** engages an upper edge of the frame **32** to lock the container in the tilted position shown in FIG. **3***b*. The locking plate preferably rotates with the rotor whereby it can be moved to engage the frame during centrifugation of the contents of the container.

The operation of the centrifuge in a preferred embodiment of the invention will be described with regard to FIGS. **4***a* through **4***f*. In a first step, blood is introduced into chamber **6** of the container through opening **13**. The blood has preferably been obtained from a patient, but it may be pooled or obtained from another. A precipitating agent **43**, e.g., PEG, is then placed in chamber **8**, preferably by injection through opening **15**. The container with blood and precipitating agent are then placed in the centrifuge for automated operation.

In the first step of automated operation, the container is allowed to swing freely as the blood is subjected to centrifugation. As illustrated in FIG. **4***a*, the cellular component **44** of the blood will be separated from the plasma component **46** in this step. After a predetermined time period, e.g., five minutes, the locking plate **36** is moved to a position shown at **36'** whereby the container **4** is held in the position shown in FIGS. **3***b* and **4***b*, and rotation of the rotor is stopped. In this position, the plasma component **46** flows through channel **18** by the force of gravity. The chamber is held in the position of FIG. **4***b* for preferably about 3 seconds, which is adequate to allow the plasma to drain by gravity into the chamber **8** but is not so long that the more viscous cellular component **44** drains into the chamber **8**. The plasma **46** and precipitating agent **43**, which was previously placed in chamber **8**, are now both in chamber **8**. To provide complete mixing of these fluids, the locking plate is lowered, and the rotor is caused to accelerate and decelerate alternately for 10–20 seconds, as illustrated in FIG. **4***c*. The precipitating agent causes the fibrinogen/Factor XIII to separate from the plasma, and this separation is assisted by centrifuging the contents of the container a second time. This second centrifugation may be for a period of about five minutes. A fibrinogen pellet **48** is, thus, formed in the bottom of the chamber **8**, as illustrated in FIG. **4***d*. At this stage of the process, the plasma supernatant **46** remains in chamber **8**.

Plasma **46** is separated from the fibrinogen pellet **48** by stopping rotation of the centrifuge rotor to allow the container to pivot to the upright position shown in FIGS. **3***a* and **4***e*. The locking plate **36** is then activated to lock the container in that orientation by engagement with protuberance **42**, and the container is again rotated by the rotor for a period of about three to eight seconds. This rotation causes the supernatant plasma **46** to flow back through channel **18** and into chamber **6** by centrifugal draining, as illustrated in FIG. **4***e*. Thus, the fibrinogen pellet and plasma have now been separated. As a final step, the container is subjected to another centrifugation illustrated in FIG. **4***f* for about fifteen seconds, whereby the fibrinogen pellet is forced into the bottom of the chamber **8**.

The automated process for production of fibrinogen is at this point complete, and the fibrinogen pellet is preferably extracted from the container **8** by a syringe for further processing. For example, the fibrinogen may be reconstituted and combined with thrombin to produce a sealant or an adhesive.

The apparatus of the invention may be used for other automated processes. For example, another technique for the separation of fibrinogen from blood in accordance with the structure of the invention uses cryoprecipitation. According to this technique, plasma is frozen to a temperature of about minus 20° C., thawed, and then centrifuged to separate the fibrinogen from plasma. The multiple-decanting apparatus of this invention may be used to automate cryoprecipitation by inclusion of a temperature control device **50** in thermal contact with the centrifuge. The temperature control device may comprise any of several known structures, including liquid nitrogen or liquid oxygen based devices and refrigeration devices.

To effect automated cryoprecipitation, a sample of blood is placed in the first chamber **8**, and the container is then placed in the centrifuge and subjected to a first centrifugation. The plasma is then drained into the second chamber **8**, for example by gravity draining. The temperature control device is then activated first to freeze the plasma and then to allow the plasma to thaw. The thawed plasma is subjected to a second centrifugation, which separates fibrinogen from the remainder of the plasma. The supernatant plasma is then separated from the fibrinogen by draining it back into the first chamber, for example by centrifugal draining, whereby only fibrinogen remains in the second chamber. The container is then removed from the centrifuge, and the fibrinogen removed from it for use as described above. Of course, the freeze-thaw-centrifuge process may be carried out any number of times before the supernatant is drained back into the first chamber.

Modifications within the scope of the appended claims will be apparent to those of skill in the art.

We claim:

1. A method for automatic separation of components from fluids comprising placing first and second chambers in a centrifuge, subjecting said first chamber to centrifugation, locking said chambers in first positions such that a supernatant in said first chamber drains into said second chamber, subjecting said second chamber to centrifugation, and locking said chambers in second positions for allowing a supernatant in said second chamber to transfer to another of said chambers.

2. A method according to claim **1** wherein said another of said chambers is said first chamber, said supernatant in said first chamber drains into said second chamber by gravity draining, and said supernatant in said second chamber transfers into said first chamber by centrifugal transfer.

3. A method according to claim **1** further comprising the step of freezing said supernatant in said second chamber prior to said step of subjecting said second chamber to centrifugation.

4. A method according to claim **3** further comprising thawing said supernatant and wherein said step of subjecting said second chamber to centrifugation is performed as said supernatant is thawing.

5. A method according to claim **4** wherein said another of said chambers is said first chamber, said supernatant in said

first chamber drains into said second chamber by gravity draining, and said supernatant in said second chamber transfers into said first chamber by centrifugal transfer.

6. A method for separation of components of a substance comprising:

placing a first substance in a first chamber of a container having at least two separate chambers in fluid communication with each other,

rotating said container to centrifuge said first substance and separate said first substance into a first component and a second component,

locking said container in a first position that allows said first component to flow into a second chamber of said container,

rotating said container again to centrifuge said first component to produce a third component and a fourth component, and

locking said container in a second position that allows said third component to flow to said first chamber.

7. A method according to claim 6 wherein said first component drains into said second chamber by gravity.

8. A method according to claim 7 further comprising the step of centrifugally transferring said third component by rotating said container while locking said container in said second position.

9. A method according to claim 8 wherein said first substance contains blood, said first component contains plasma, and said fourth component contains fibrinogen.

10. A method according to claim 9 wherein said second chamber is supplied with a precipitating agent prior to said step of rotating said container to centrifuge said first substance.

11. A method according to claim 10 wherein said precipitating agent is PEG.

12. A method for centrifuging substances comprising: providing a removable container having a plurality of chambers for receiving substances to be centrifuged; placing one or more substances in said container; rotating said container a first time to subject said substances to centrifugation; locking said container in a first position to allow a supernatant in one of said chambers to transfer into a second of said chambers; and locking said container in a second position and rotating said container a second time to transfer a supernatant in said second chamber to said one of said chambers.

13. The method of claim 12, wherein the step of locking said container in said first position causes said supernatant in said one of said chambers to transfer substantially into said second chamber by gravity.

14. The method of claim 12, wherein the step of locking said container in said second position and rotating said container causes a supernatant in said second chamber to transfer substantially into said one of said chambers by centrifugal transferring.

15. The method of claim 12, wherein the step of locking the container in said first position comprises holding said container in said first position for a predetermined period of time.

16. The method of claim 12, wherein the step of locking the container in said first position comprises controlling the position of a movable plate.

17. The method of claim 12, further comprising controlling the locking and rotating of said container to provide automatic multiple decanting, wherein the container is locked and/or rotated at respective intervals of predetermined duration.

18. The method of claim 12, further comprising the step of mixing said one or more substances in said container by accelerating and decelerating the rotation of the container.

19. The method of claim 12, further comprising the step of maintaining the substances in at least one chamber separate from each other with a divider.

20. The method of claim 19 wherein said divider has an opening for allowing said substances to be discharged from said at least one chamber.

21. The method of claim 12, wherein the step of placing one or more substances into said container comprises the step of placing blood in said one of said chambers and a precipitating agent in said second of said chambers, wherein the step of rotating said container a first time causes a supernatant plasma to be separated from a cellular component of said blood, and the step of locking said container in said first position causes said supernatant plasma to be substantially transferred from said one of said chambers into said second of said chambers, while substantially leaving said cellular component in said one of said chambers.

22. The method of claim 21, further comprising the step of mixing said supernatant plasma and said precipitating agent in said second chamber, and rotating said container again to cause fibrinogen and Factor XIII to be precipitated from the supernatant plasma to create a pellet in said second of said chambers.

23. The method of claim 22, wherein the step of locking and rotating said container a second time causes a supernatant resulting from said precipitation to be substantially transferred from said second chamber to said one of said chambers, thereby leaving behind said pellet in said second chamber.

24. A method for centrifuging substances comprising: providing a unitary container having a plurality of chambers therein for receiving substances to be centrifuged; placing one or more substances into said container; rotating said container a first time to subject said substances to centrifugation; locking said container in a first position to allow a supernatant to be transferred from one chamber to another chamber by gravity; locking said container in a second position and rotating said container a second time to cause a supernatant to be transferred from one chamber to another chamber by centrifugal transfer.

25. The method of claim 24, wherein the container comprises a first and a second chamber, wherein the step of placing substances within the container comprises placing one substance in the first chamber and a second substance in the second chamber.

26. The method of claim 25, wherein the step of rotating said container a first time causes a supernatant to separate from the one substance in said first chamber, wherein the step of locking the container in said first position causes the supernatant in said first chamber to be transferred by gravity into said second chamber through a passage between said first and second chambers.

27. The method of claim 26, further comprising the step of mixing said supernatant and second substance in said second chamber by accelerating and decelerating the rotation of the container for a predetermined time, wherein said mixing helps to produce a precipitation in said second chamber.

28. The method of claim 27, further comprising rotating the container again to accelerate the formation of said precipitation in said second chamber, wherein the precipitate in said second chamber is forced to the bottom of said second chamber in the form of a pellet.

29. The method of claim 28, wherein the step of rotating the container a second time causes the supernatant resulting from said precipitation to be transferred from said second chamber to said first chamber, leaving behind the precipitation in the form of a pellet in said second chamber.

30. The method of claim 29, further comprising controlling the steps in the process to provide automatic multiple decanting which allows for activation of one or more steps in the process for a predetermined period of time.

31. The method of claim 30, wherein the step of placing one or more substances in said container comprises placing blood in said first chamber and a precipitating agent in said second chamber.

* * * * *

32. A method for treating physiological products, comprising:

providing a centrifuge;

providing a container having at least a first chamber and a second chamber, wherein each of the first and second chambers have a top portion, a bottom portion and a set of walls, wherein the top portions of the first chamber and second chamber are connected by a bridge for transferring fluid therebetween; and

providing a holder assembly attached to the centrifuge and effective to removably receive the container, wherein the holder assembly is effective to position the container in one or more predetermined positions.

33. The method of claim 32, wherein the chambers include removable lid portions, thereby forming a closed container.

34. The method of claim 33 wherein at least one of the chambers includes an access port for transference of a liquid.

35. In a method of treating physiological fluids, the improvement comprising providing a container adapted to contain said fluids during treatment, wherein said container comprises:

at least a first chamber having a top portion, a bottom portion and a first set of walls;

a second chamber having a second top portion, a second bottom portion and a second set of walls;

and a bridge connecting the top portion of the first chamber and the top portion of the second chamber, such that a substance can be transferred from the first chamber to the second chamber while the container is positioned at a predetermined angle.

36. The method of claim 35, wherein the chambers include a removable lid portion.

37. The method of claim 36, wherein at least one of the chambers includes an access port for transference of a liquid.

38. A method for treating physiological products and maintaining sterility of said products during said treating comprising:

providing a container having a plurality of closed, sterile fluid-receiving chambers, a bridge forming a fluid path allowing fluid communication between a first of said chambers and a second of said chambers when said container is in a predetermined orientation, and at least one access port allowing access to at least one of said chambers to maintain sterility, and

providing a centrifuge having a holder removably receiving said container and allowing said container to assume a first orientation wherein a physiological product in one of said chambers is subjected to centrifugation and said predetermined orientation wherein fluid in said first of said chambers flows along said fluid path to said second of said chambers.

39. A method according to claim 38 wherein said holder comprises a frame pivotally mounted to a centrifuge rotor.

40. A method according to claim 38 wherein said centrifuge further comprises a movable locking plate that is movable between free and locking positions, wherein said plate allows said container to assume said first orientation when in said free position and holds said container in said predetermined position when in said locking position.

41. A method according to claim 40 wherein said centrifuge further comprises an electromagnet for moving said locking plate to one of said locking and free positions.

42. A method according to claim 38 wherein said holder comprises a frame pivotally mounted to a centrifuge rotor, and said centrifuge further comprises a movable locking plate that is movable between free and locking positions, wherein said plate engages said frame to allow said container to assume said first orientation when in said free position and to hold said container in said predetermined position when in said locking position

43. In a method of treating physiological fluids, the improvement comprising providing a container adapted to contain said fluids during treatment, wherein said container comprises a base forming a plurality of sterile chambers, each of said chambers having a bottom and a top, a bridge connecting at least two of said chambers and arranged to provide a sterile fluid channel from a first of said at least

two sterile chambers to a second of said at least two sterile chambers when said container is in a predetermined orientation, a lid closing said top of each of said plurality of chambers, and access ports that provide access to the chambers while maintaining sterility.

44. A method according to claim 43 wherein said plurality of sterile chambers and said bridge comprise a molded base part.

45. A method according to claim 44 wherein said container is substantially rigid.

46. A method according to claim 43 wherein said container further comprises a separation disk in one of said chambers.

47. A container according to claim 43 wherein said plurality of chambers comprise first and second adjacent chambers having adjacent sidewalls and said bridge is formed at the tops of said adjacent sidewalls.